Effects of listening comprehension, word recognition, and oral reading fluency on reading comprehension in second-grade students

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Abstract

Several studies have provided evidence regarding the importance of listening comprehension, word recognition and oral reading fluency in successful reading comprehension; however, most of the research has been conducted with English language speakers. This study aims to examine the direct effects of these three variables on reading comprehension using a sample of European Portuguese speakers. A sample of 325 second-grade Portuguese students completed the Test of Word Reading, the Reading Fluency Assessment Test, the Test of Listening Comprehension of Narrative Texts and the Test of Reading Comprehension of Narrative Texts. Path analysis showed that listening comprehension, word recognition and oral reading fluency were all significant predictors with unique effects on reading comprehension at this grade level. The combination of all three predictors explained 41% of the variance observed in reading comprehension. The results are discussed in terms of the practical implications and limitations of the study, and guidelines for future research are presented.

Keywords: listening comprehension, word recognition, oral reading fluency, reading comprehension, path analysis.

Introduction

Reading comprehension has been defined as an ability that entails the construction of meaning through contact and involvement with written language (RAND Reading Study Group, 2002). This complex ability is influenced by several factors, of which word recognition, oral reading fluency and listening comprehension are some of the most studied (Hoover & Gough, 1990; Padeliadu & Antoniou, 2014).

Empirical evidence concerning the relationship between word recognition and reading comprehension over primary school has been found in several studies (Adlof, Catts, & Little, 2006; Cutting & Scarborough, 2006). The results from studies conducted with Portuguese students from the second to fourth grades found correlations between word recognition and reading comprehension ranging from .36 to .55 (Cadime et al., 2013; Ribeiro, Cadime, Freitas, & Viana, 2015). The overall findings of these studies converge in the conclusion that reading comprehension is compromised when students have poor word recognition. This assumption has been explained using the framework proposed by La Berge and Samuels (1974) and Perfetti (1985). According to this framework, during the initial stage of reading acquisition, most beginning readers allocate a large amount of cognitive resources to the process of word recognition because this process is not yet automatized. When word recognition becomes increasingly automatized, cognitive resources can be allocated to the process of reading comprehension. Consequently, deficits in word recognition lead to reading comprehension difficulties. However, if word recognition is a necessary condition, it is not sufficient to guarantee that the reader comprehends what he reads. The attainment of fluent reading also plays an important role in the achievement of higher levels of reading comprehension. Studies conducted with English-speaking students attending the second grade (Burns et al., 2011), third grade (Roehrig, Petscher, Nettles, Hudson, & Torgesen, 2008) and fourth grade (Jenkins, Fuchs, Broek, Espin, & Deno, 2003) indicated that oral reading fluency is a strong predictor of reading comprehension. Similarly, large and statistically significant correlations have been found between oral reading fluency and reading comprehension in English-speaking students (Burns et al., 2011; Denton et al., 2011). These findings were confirmed in studies with samples of different school grades using cross-sectional and longitudinal designs.

For example, Kim et al. (2010) conducted a longitudinal study with English-speaking students who were followed from kindergarten to third grade and found that oral reading fluency was a strong predictor of reading comprehension in the first three grades of elementary school. In general, the results of the research conducted with English speakers appear to note that the relationship between oral reading fluency and reading comprehension is stronger in the early elementary school grades and weaker during secondary school grades (Yovanoff, Duesbery, Alonzo, & Tindal, 2005). A previous study conducted with European Portuguese speakers indicated that oral reading fluency had a correlation of .67 with reading comprehension in the second grade (Ribeiro et al., 2015).

Reading comprehension is also predicted by listening comprehension. Several studies have shown that difficulties in reading comprehension are explained by deficits in listening comprehension skills in English-speaking students (Cain & Oakhill, 2006; Nation & Snowling, 1997). The studies conducted with speakers of more transparent languages are not very frequent, but appear to note similar results. For example, large and statistically significant correlations between listening and reading comprehension were found by Hagtvet (2003), using a Norwegian sample of students aged nine years. Other studies with Korean speaking children who had received two years of reading instruction found similar results (Kim, Park, & Wagner, 2014). Studies that examined the contribution of word recognition and listening comprehension to reading comprehension found that these two variables explained 40% to 60% of the variance observed in reading comprehension (Joshi & Aaron, 2000; Joshi, Tao, Aaron, & Quiroz, 2012).

1.1. The present study

In conclusion, several studies have tested the direct effects of word recognition, oral reading fluency and listening comprehension on reading comprehension. However, most of these studies were conducted with English speakers. Given that English is a deep orthography, the results of most studies may not be generalizable to more transparent orthographies such as European Portuguese. The results of previous studies conducted with Portuguese students from primary school indicated the existence of medium to high correlations among reading comprehension, word recognition and oral reading fluency (Cadime et al., 2013; Ribeiro et al., 2015); however, these studies did not examine the unique effect of listening comprehension. Therefore, the present study aims to examine the direct effects of listening comprehension, word recognition and oral reading fluency on reading comprehension.

Methods

2.1. Participants

A total of 325 students in the second grade ($Mean_{age}$ = 7.41, St. $Dev._{age}$ = .546) participated in this study. Students attended public (n = 282, 86.8%) and private schools (n = 43, 13.2%) from northern Portugal. More than half the students were boys (n = 167, 51.4%). These percentages are representative of the distribution of the students in the population, given that according to the data of the National Council for Education and the National Office of Education and Science Statistics for the 2012/2013 academic year, 88.3% of children from first to fourth grade attended public schools, of which 51.5% were boys. Students with special education needs were not included in the sample. All students were of Portuguese nationality.

2.2. Measures

Test of Word Reading (TLP – *Teste de Leitura de Palavras*) (Chaves-Sousa et al., 2015). This is a subtest of The Battery of Reading Assessment (BAL – *Bateria de Avaliação da Leitura*) (Ribeiro & Viana, 2014), and it was used to assess single word reading accuracy. The TLP includes four vertically scaled forms for students in grades one to four. For the purpose of this study, the test form for the second grade (TLP-2) was administered. It includes 30 items (single words) that are presented in isolation through a computer application. The student reads aloud the words that are presented, which are isolated on the computer screen. Each correct response is scored with 1 point, and a raw score is computed by adding them together. The reliability coefficients of the TLP-2 are high (PSR = .88; ISR = .99; KR-20 = .92). The results of the TLP-2 are correlated with the results obtained in other tests of word reading and with the teachers' ratings of the students' performance in reading. The administration was individual and untimed.

Reading Fluency Assessment Test (*Teste de Avaliação da Fluência e Precisão de Leitura "O Rei"*) (Carvalho, 2010). This test was constructed to assess reading fluency in students from second to sixth grade. The text is composed of 281 words, and it is an adapted version of the tale "The Emperor's New Clothes" by Hans Christian Andersen. Each student must read the text aloud within a time limit of three minutes. The number of correct words read per minute is then computed. The test presents adequate reliability and validity indicators.

Test of Listening Comprehension of Narrative Texts (TCTMO-n – *Teste de Compreensão de Textos na Modalidade Oral – Narrativo*) (Santos et al., 2015; Viana et al., 2015). The TCTMO-n is a subtest of the BAL (Ribeiro & Viana, 2014) that assesses the listening comprehension of narrative texts. This test includes four vertically scaled forms for students in grades one to four. In this study, the test form for students in grade two

(TCTMO-n-2) was administered. The student listens to the text passages, which are followed by multiple-choice questions (30 items) with three options, also presented orally, and indicates the chosen option. Each response is scored with one point, and the raw score is computed by adding the points for the correct answers together. The TCTMO-n-2 reliability coefficients are high (ISR = .96; PSR = .73; KR-20 = .77). Validity evidence was also provided for the test scores by obtaining significant correlations with other tests of listening comprehension. The administration was collective and untimed.

Test of Reading Comprehension of Narrative Texts (TCTML-n – *Teste de Compreensão de Textos na Modalidade de Leitura – Narrativo*) (Ribeiro, Viana, Cadime, Santos, & Spinillo, 2014). This is another subtest of the BAL (Ribeiro & Viana, 2014). It assesses students' reading comprehension of narrative texts. The TCTML-n is composed of specific test forms for students in grades two to four and is presented in a pencil-and-paper format. Each student reads the text passages silently and then completes multiple-choice questions with three options; the chosen option is marked on an answer sheet. The responses are scored as 0 (incorrect) and 1 (correct). The raw score is computed by adding the correct answers together. The test form for the second-grade students (TCTML-n-2) was used in this study. The test form is composed of 27 items as follows: eight assess literal comprehension; 14 assess inferential comprehension; three evaluate reorganization; and two evaluate critical comprehension. The TCTML-n-2 reliability coefficients are high (ISR = .96; PSR = .70; KR-20 = .77). The administration of the TCTML-n was collective and untimed.

2.3. Procedures

Legal authorisations for the administration of the tests were obtained from the Portuguese Ministry of Education and the school boards, and informed consent for student participation was acquired from students' parents or legal tutors. Tests were administered by trained psychologists, according to the instructions provided in the technical manuals. All students completed the tests in the same order.

2.2. Statistical analyses

Descriptive statistics (frequencies, mean scores and standard deviations) were calculated using IBM® SPSS® (version 22) software. Pearson correlations (*r*) were computed to analyse the relationships between all measured variables. The magnitudes of the correlations were evaluated using the criteria proposed by Cohen (Cohen, 1992): .10 indicates a small effect; .30, a medium effect; and .50, a large effect. To test the direct effects of word recognition, oral reading fluency and listening comprehension on reading comprehension, path analysis was implemented using Mplus version 6.1 software (Muthén & Muthén, 2010). In this study, *p* values less than .05 indicated statistically significant results.

Results

Tab. 1 provides the descriptive statistics (number of participants, means and standard deviations) for each measured variable, as well as the correlations between all variables.

Tab. 1. Descriptive statistics and correlations

Variable	N	M	SD	ORF	LC	RC
WR	305	111.15	7.85	.665***	.328***	.481***
ORF	304	62.63	24.50	-	.248***	.500***
LC	297	108.34	10.25		-	.491***
RC	312	100.31	10.17			-

Note. WR = Word Recognition; ORF = Oral Reading Fluency; LC = Listening Comprehension; RC = Reading Comprehension; M = Mean; SD = Standard Deviation.
***p < .001

All correlations were statistically significant. Large correlations were found between word recognition and oral reading fluency and between reading comprehension and oral reading fluency. Medium correlations were found between reading comprehension and the other variables. Word recognition also had a medium-size correlation with listening comprehension. A low correlation was found between oral reading fluency and listening comprehension.

Regarding the path analysis results, all path coefficients were statistically significant (see Fig. 1). Word recognition, oral reading fluency and listening comprehension were directly and uniquely related to reading comprehension. The model explained 41% of the variance observed in reading comprehension.

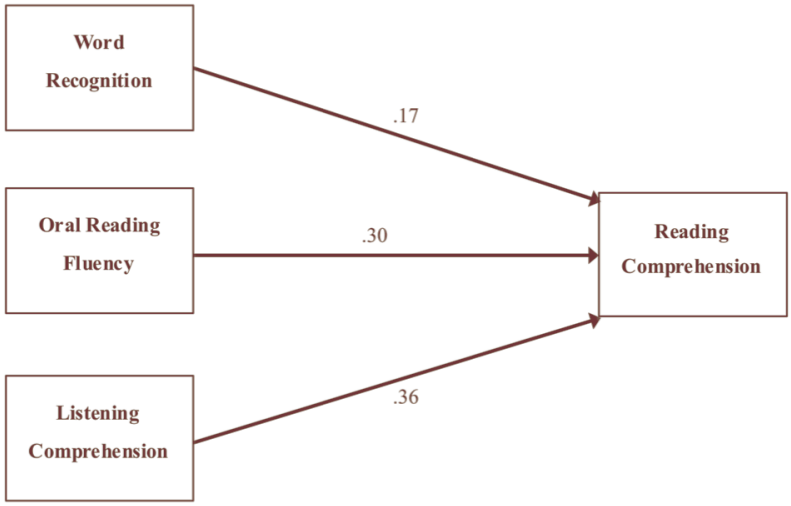

Fig. 1. Path model with the standardized regression coefficients.
Note: all regression coefficients were statistically significant ($p < .05$). $R^2 = .410$

Discussion and conclusions

The current study aimed to examine the direct effects of word recognition, oral reading fluency and listening comprehension on reading comprehension in a sample of second grade students who were speakers of European Portuguese, an intermediate depth orthography.

The correlations between reading comprehension and the other three variables (word recognition, oral reading fluency and listening comprehension) were statistically significant and ranged between .48 and .50. Considering the criteria proposed by Cohen (1992), the magnitudes of these correlations were medium-to-large. The correlations between reading comprehension and word recognition and between oral reading fluency and reading comprehension were very similar to those obtained in other studies with Portuguese students (Cadime et al., 2013; Ribeiro et al., 2015). The results of this study also indicate that listening comprehension has a medium-to-high correlation with reading comprehension, as previously observed for other languages (Hagtvet, 2003).

Moreover, the results of the path analysis showed that word recognition, oral reading fluency and listening comprehension had a unique effect on reading comprehension. The model explained more than 40% of the variance observed in reading comprehension, a percentage that is similar to that observed in previous studies, using only word recognition and listening comprehension as predictors (Joshi & Aaron, 2000; Joshi et al., 2012). These findings indicate the necessity of promoting not only basic reading abilities, such as word recognition and fluency, but also oral language comprehension skills to obtain higher levels of comprehension of written texts, even in the initial years of schooling.

One limitation should be considered in the interpretation of the results obtained in this study. Although representative, the sample size is relatively low. Future studies should attempt to replicate this result using a larger sample size. The influence of listening comprehension, word recognition and oral reading fluency on reading comprehension has been reported in several studies, and some of them indicate that this influence changes across school grades (Adlof et al., 2006; Kim, Wagner, & Lopez, 2012). Furthermore, other variables, such as vocabulary and reasoning, can have an additional effect on reading comprehension, particularly after the initial school grades (Ribeiro et al., 2015). Therefore, the structural invariance of the models across school grades should also be investigated, and other cognitive skills that have an effect on reading comprehension (e.g., vocabulary and reasoning) should also be included in the models that are tested in future studies.

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